Santa Cruz Port District
Proposed Dredging Demonstration Project
Revised January 3, 2001

BASIC PROJECT DESCRIPTION:

Santa Cruz Port District is proposing to dredge 3,000[1] cubic yards of sediment from its north harbor and discharge it into the surf-line between 5th Avenue and 7th-Avenue.

MATERIAL COMPOSITION:

The source of the 3,000 cubic yards of material was the Arana Gulch watershed. The material was deposited into the north harbor during the El Niño storms of January 1998. Arana Gulch is the steep watershed above Santa Cruz Harbor and Highway 1. The material is clean and has been deemed suitable for "unconfined aquatic disposal" by the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency Region IX.

MATERIAL TESTING PROTOCOLS:

The material has been lab tested according to all criteria prescribed by the U.S. Army Corps of Engineers' regulations. Third-party contractors take the samples, ensure chain of custody, and deliver it to the lab. The lab is a bonded entity with the highest standards and credentials.

Material Constituents:

Grain Size:
The material averages 42% sand and 58% silts and clays.

Chemical Analysis:
The material had been tested for:

- Organic compounds;
- Poly aromatic hydrocarbons
- PCB's (aroclors)
- Pesticides

[1] The dredging demonstration project was originally proposed as a 12,000 CY project (USACOE PN 24392S). The project has been officially reduced to 3,000 CY of material. The remaining sediment (9,000 CY) from the 1998 El Niño storms will be disposed of offshore under separate permit (Summer 2001).

- Butyltins
- Metals
- Total organo carbon
- TRPH
- Volatile solids
- Dissolved sulfides

Biological Sulfides:
The material has been tested for its ability to sustain larvae growth.

All chemical and biological standards were met. No threat to humans or habitats were found. Agencies which reviewed the test results include:

- U.S. Army Corps of Engineers
- Environmental Protection Agency Region IX
- Monterey Bay National Marine Sanctuary
- California Department of Fish and Game
- California Regional Water Quality Control Board
- Coastal Commission

DEMONSTRATION CRITERIA:

What is unusual about this project is that the material is less than 80% sand which is a rule of thumb that the Environmental Protection Agency has used to limit material being deposited in the nearshore / beach areas.

The Port District project will demonstrate that there is significant benefits for beach disposal of this material, and that replenishment will occur without negative impact to coastal resources from the fine-grained material.

The Port District proposes to conduct this discharge using methods that will ensure that silt and clay fractions:

1. Will not harm recreational resources or beach values;

2. Will not harm nearshore biotic resources in the disposal area: kelp, benthic organisms, biota.

DISCHARGE METHODOLOGY AND REASONING:

Normal Transport of Silts and Clays:

The sediment will be dredged in the high wave energy environment of the nearshore which will transport all light fractions (silts and clays) out to deep sea areas, identical to the dispersion pattern of discharging rivers such as the San Lorenzo River, Soquel Creek, Aptos Creek.

The Port District and the California Department of Boating and Waterways commissioned a sediment transport study by the GeoSea Consulting company which confirmed that silts and clays are unstable in the nearshore and will not come to rest there. Other historical studies confirm this finding.

Time of Year:

The discharge of the sediment will occur in February and March when wave energy is highest and dispersal potential is the greatest.

Volume:

350 to 500 cubic yards of material (262 - 300 CY silts and clays) will be discharged per day, 4 days maximum per week. The entire project will take a total of six to nine dredging days. The total project will take place over a two to three week period, depending on weather. This is a small volume compared to the ocean's energy.

Time of Day:

5:00 pm to 10:00 pm, Mondays through Thursdays. This will ensure least direct impact of the material on the recreational users of the beach.

Pipeline:

Disposal will be offshore approximately 50 to 75 yards south of the beach at 6th Avenue.

PERMIT PROCESS:

Permits:

U.S. Army Corps of Engineers, Regulatory Branch, 333 Market Street, San Francisco, CA 94105-2197: Permit pends. (Public Notice 24392S)

Coastal Commission, 725 Front Street, Suite 300, Santa Cruz, CA 95060: Permit application filed. Hearing scheduled for second week of February 2001.

California Regional Water Quality Control Board, 81 Higuera Street, Suite 200, San Luis Obispo, CA 93401: Permit pends.

Public Briefing by Port District: Wednesday, January 31, 7:00 pm, Public Meeting Room, 365-A Lake Avenue, Santa Cruz.

REFERENCES:

- GeoSea Consulting Sediment Transport Analysis
- Moss Landing Marine Lab Monitoring Program Proposal, December 15, 2000
- "Surf Zone Disposal at Santa Cruz Small Craft Harbor: Baseline Study"; February 4, 2000, Steve Watt.

CONTACT:

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Literature cited

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Wolf, S.C.1970, Coastal currents and mass transport of surface sediments over the shelf regions of the Monterey Bay, California, Marine Geology, v. 8, n. 5, p.321-336.

Dr H. Gary Greene
Steve Watt, M.Sc Candidate
Moss Landing Marine Laboratories

Santa Cruz Small Craft Harbor
Demonstration Dredging Event Monitoring Program

Details and timeline of side-scan sonar/multibeam surveys,
sediment sampling and sample locations

The Santa Cruz Harbor Port District wishes to remove 12,000 yd^3 (9,182 m^3) of fine-grained material deposited in the North (upper) Harbor. Material is derived from erosion of the Arana Gulch immediately north of the harbor and transported by rainfall run off. The Port District would like a chance to demonstrate that this material is suitable for near-shore disposal without causing harm to coastal resources or downcoast beaches and it may in fact be beneficial to beaches due to the density and fraction of sand that would allow beach agradation. It is proposed that the 12,000 yd^3 (9,182 m^3) of material be released in 500-700 yd^3 (approximately 380-540m^3) intervals into the surf zone approximately 70 yards (64 meters) from the shore of Twin Lakes State Beach, just east of the harbor. The demonstration materials will be dispersed over the course of four evenings, Monday to Thursday from 4:00-10:00 pm, for four to six weeks, on dates yet to be determined within the months of December-March 2000. The demonstration will take place during times of high surf to ensure a high degree of sediment mixing and transport.

Moss Landing Marine Laboratories, under the guidance of Dr. H. Gary Greene and Masters of Science candidate Steve Watt, will monitor the dredging demonstration event. The monitoring program consists of three phases: Pre-demonstration, Demonstration, and Post-demonstration. A variety of scientific tools and methods will be used to study sedimentary changes that may or may not occur during the demonstration. High-resolution side-scan sonar and multibeam bathymetry data will be collected during the Pre- and Post-demonstration phases as well as comprehensive onshore and offshore sediment and water sampling from Point Santa Cruz to Soquel Point (Figure1). The Demonstration phase will consist of daily sediment and water sampling events on and offshore at designated high priority locations due to the proximity of the demonstration

outfall (Figure 2). Sediment samples will be analyzed for grain size characteristics and water samples will be tested for level of turbidity. Oceanographic data of tide, swell direction, height, and period. Wind speed, direction and rain data (if applicable) will be recorded through all phases of the project.

Pre-demonstration

To properly design the monitoring program, extensive amounts of literature regarding the sediment transport, coastal geology, oceanography, and habitat of the Monterey Bay was reviewed. A pilot study was conducted using sediment samples collected at beaches from Cowells Cove to Moran Lake. Offshore grain size data was used from the Sediment Trend Analysis of the Santa Cruz Harbor by Dr. Patrick McClaren of GeoSea for the Port District in 1999. Side-scan sonar maps of Northern Monterey Bay produced by the USGS (available on the web) in 1993 were also interpreted and incorporated into the pilot study to gain an understanding of the offshore sedimentary regime near the Santa Cruz Small Craft Harbor and to help design the monitoring program.

Data collected in the Pre-demonstration phase will provide a clear baseline of the "natural" conditions onshore and offshore in the harbor vicinity before the input of material from the North Harbor. Baseline information will be used in comparison to data collected in the other two phases of the project to resolve any changes that may appear in the sedimentary regime.

The side-scan sonar/multibeam survey will cover approximately 10km^2 from Point Santa Cruz to Soquel Point and will take approximately 1-3 full days, depending on the oceanographic conditions at the time (Figure 1, Table 1). The Seafloor Mapping Lab at CSUMB, headed by Dr. Rikk Kvitek, will assist in collection of sonar data. The survey will take place as close before the demonstration event as is physically possible. Depending on weather forecasts, Friday, Saturday, Sunday, and possibly Monday mornings prior to the demonstration event are scheduled for survey days.

Nineteen onshore sediment samples (plus several replicates) and 4 surf zone water samples will be collected Sunday evening or Monday morning at pre-determined locations from Point Santa Cruz to Moran Lake (Figure 1, Table 1), including those samples labeled as High Priority on Figures 1 and 2. Sediment samples will be collected

just above the interface of the waterline and beach because this area has the highest probability of receiving demonstration material at these times. Twin Lakes State Beach will receive a greater focus of samples, including four back beach samples (not shown in Figures), due to proximity to the demonstration outfall.

Twenty offshore sediment samples (plus several replicates) and four water samples will be collected from pre-determined locations between Point Santa Cruz and Soquel Point by Moss Landings RV Ed Ricketts on Sunday or Monday mornings, including those samples labeled as High Priority in Figures 1 and 2. Differential GPS will used to find designated sediment and water sample locations and a grab sampler will be deployed to obtain sediment samples. The sediment data will help to "ground truth" the side-scan sonar/multibeam survey and provide information to resolve changes in the sea floor sedimentary distribution.

Demonstration Event

The Demonstration event will be conducted over a four to six week period. Dredging will take place each week from Monday to Thursday. Twelve pre-determined, high priority onshore and offshore sediment samples (plus several replicates) and four water samples will be collected Monday morning before dredging and again Friday morning following that weeks demonstration. A total of two sampling events will occur for each week of the 4-6 weeks during the demonstration (Figure 2, Table 1). Visual observations (if possible in the evening) and Differential GPS positions will be recorded to track the plume as it progresses over time each evening.

Post-demonstration

A survey identical to the Pre-demonstration side-scan sonar/multibeam survey will resume as soon as possible following Thursday's final dredging event. If conditions are agreeable, the survey will be conducted Friday, Saturday, Sunday, and Monday if necessary.

Sediment and water sample locations onshore and offshore will be the same as described in the Pre-demonstration phase and will be collected Friday following the final dredging event on Thursday evening.

Table 1. Santa Cruz Small Craft Harbor Demonstration Event Survey and Sampling Timeline

Event	Data Collection	Area/# samples	Time	Days*
Pre-demonstration	Side-scan sonar/ multibeam bathymetry	10 km^2	1-3 days**	Friday, Saturday, Sunday (prior to Demonstration event)
	Sediment Sampling	39 total		
	onshore	19	1 day	Sunday or Monday Morning (Prior to Demonstration event)
	offshore	20	1 day	Sunday or Monday Morning (Prior to Demonstration event)
	Water Sampling			
	onshore	4		To be taken congruently with onshore samples
	offshore	4		To be taken congruently with offshore samples
Demonstration Event				
	Sediment Sampling			
	High priority area	12 total/evening	2 days/week	Monday Morning, Friday morning
	onshore	6		12 samples (6 onshore, 6 offshore) for each evening
	offshore	6		(Based on a 6 week sampling sechedule)
		24 total/week		144 total samples for a 6 week demonstration
	Water Sampling			
	onshore	2		To be taken congruently with onshore samples.
	offshore	2		To be taken congruently with offshore samples.
		8 total/week		48 total samples for a 6 week demonstration
Post-demonstration	Side-scan sonar/ multibeam bathymetry	10 km^2	1-3 days**	Friday, Saturday, Sunday (Following Demonstration event)
	Sediment Sampling	39 total		
	onshore	19	1 day	Friday (Folowing Demonstration event)
	offshore	20	1 day	Friday (Folowing Demonstration event)
	Water Sampling			
	onshore	4		To be taken congruently with onshore samples
	offshore	4		To be taken congruently with offshore samples

* Based on the Port Districts desire to conduct the Demonstration event Monday through Thursday

** Survey days and time are highly dependent on oceanographic conditions. Relatively calm conditions are required for quality data.

*** Replicate samples will be taken intermittently, and are not included in this total.

12/15/00

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* Based on the Port Districts desire to conduct the Demonstration event Monday through Thursday

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Figure 2. Demostration Event High Priority Samples

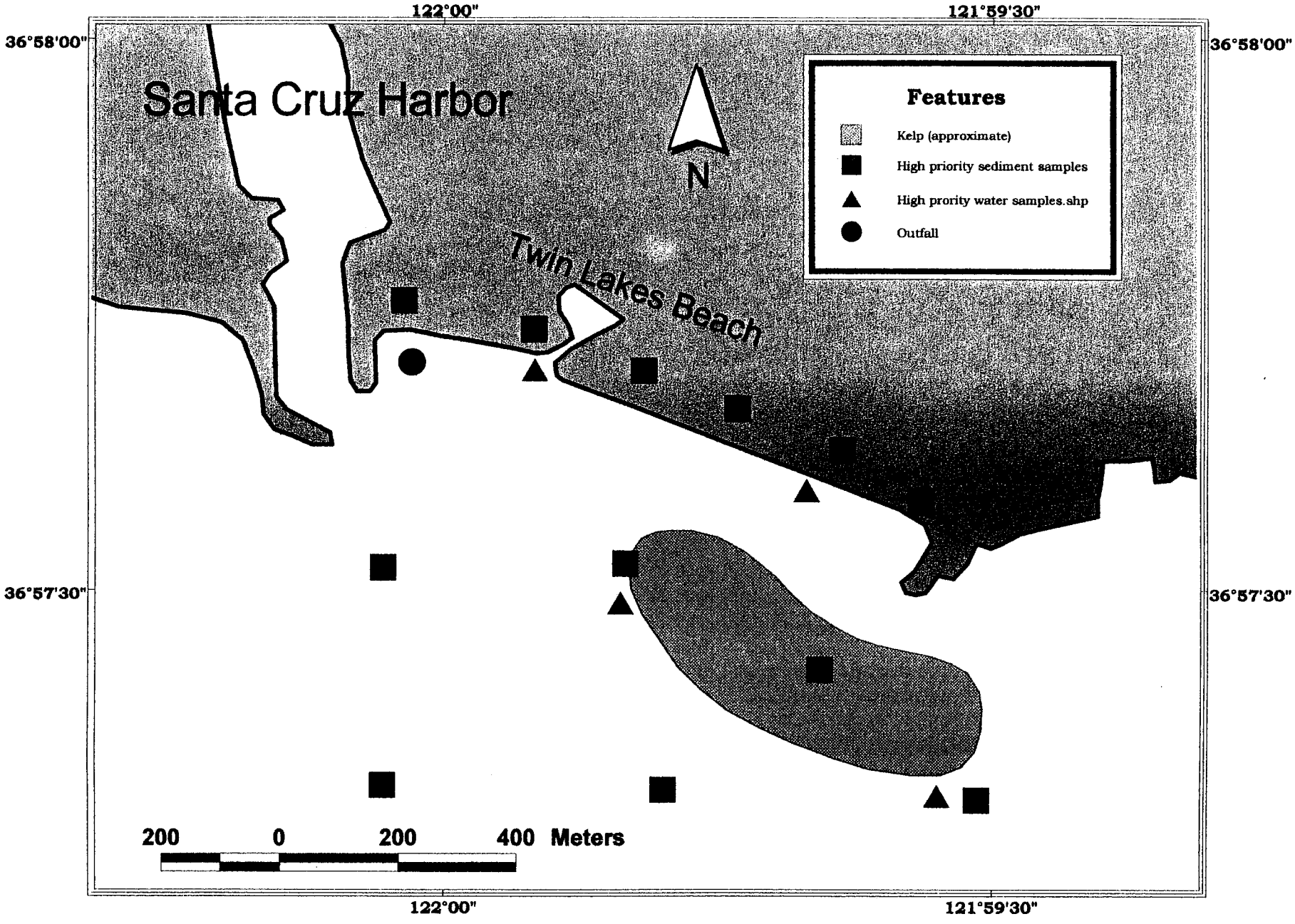
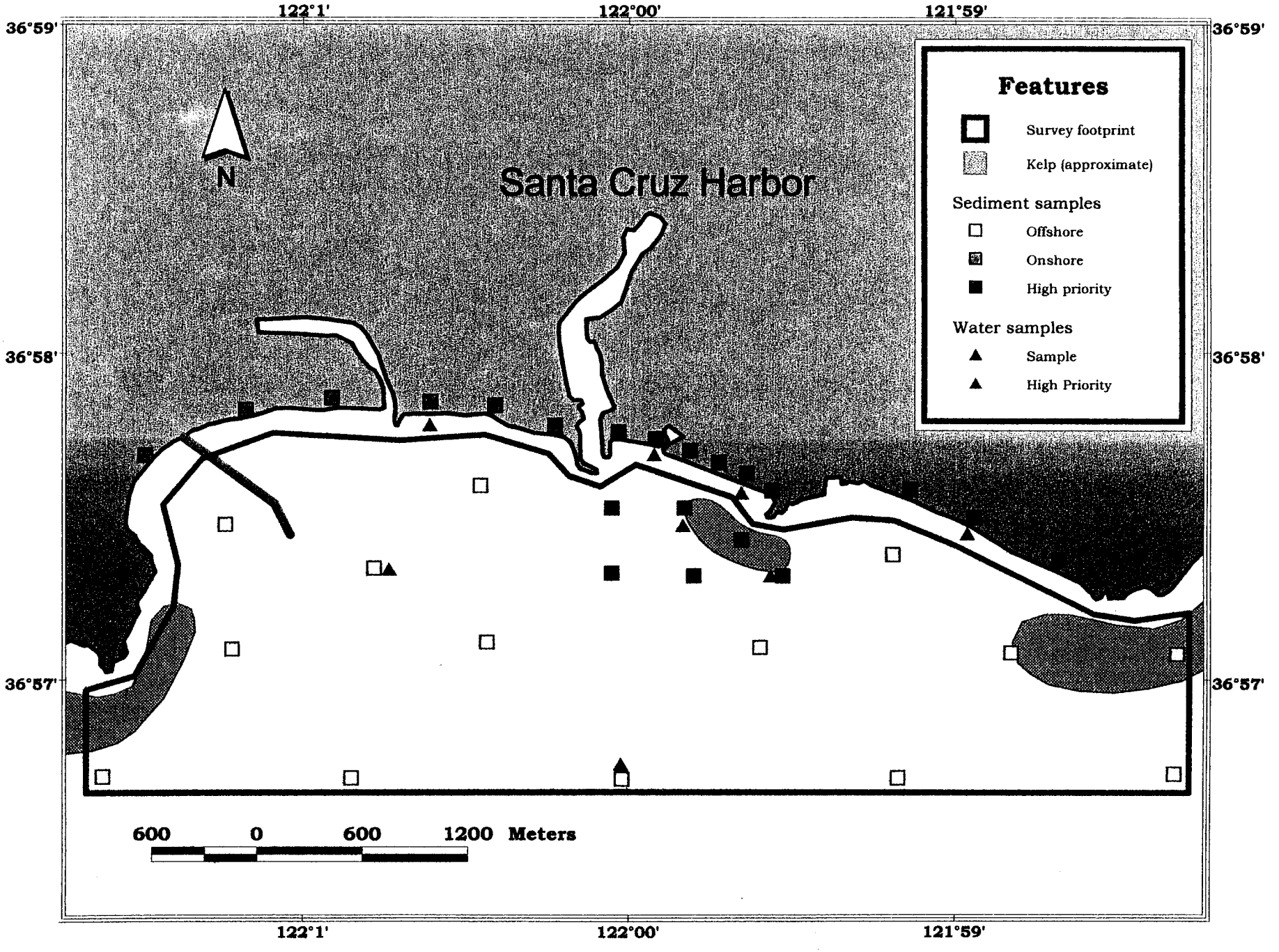


Figure 1. Survey and Sample Locations



psinet.com, 11/21/00 4:21 PM -0800, Dredge disposal

To: kgaffney@psinet.com
From: Gary Griggs <griggs@cats.ucsc.edu>
Subject: Dredge disposal
Cc: greene@mlml.calstate.edu, settreim@usgs.gov
Bcc:
X-Attachments:

PROFESSOR GARY GRIGGS
RESPONSE TO KAITILIN GAFFNEY
SEDIMENT TRANSPORT

Kaitilin:

I have studied coastal processes in Monterey Bay including the Santa Cruz Small Craft Harbor for nearly 30 years. I was contracted some years ago to evaluate long term effects of the jetties on beaches processes and shoreline configuration and also during one winter, monitored long shore drift in the vicinity of the dredge outfall to determine sediment transport direction. I feel I understand the nearshore zone of northern Monterey Bay reasonably well.

I understand that the present project is being designated as a "demonstration project" because this is sediment from the upper harbor which has a lower sand content that material dredged annually from the lower harbor/harbor entrance. As you may know, the harbor was constructed 35 years ago and has been dredged annually ever since. Initial dredging volumes were on the order of 75, 000-100,000 cubic yards annually with "equilibrium" having been more or less reached about 1978 when annual dredged volume reached about 200,000 cubic yards. I believe it has averaged about this volume in the subsequent 20 years. The dredged material is normally discharged in the late winter months on Twin Lakes Beach. My understanding is that the volume being proposed for discharge from the upper harbor is ~12,000 cubic yards, or about 6% of the volume typically dredged and discharged into the surf zone at Twin Lakes Beach from the lower harbor/harbor entrance area.

To provide another comparison for the magnitude of this proposed discharge, the San Lorenzo River, 3000 feet updrift from the disposal site , discharges on average, ~325,000 tons of suspended sediment annually, dominantly silt and clay. From a knowledge of beach and nearshore sediment in the area, it is clear that neither silt nor clay will remain in the nearshore zone (depths less than 25 feet or so) because of the high wave energy. As a result, and fines (silt or clay) discharged on the shoreline or in shallow depths, particularly during the winter months, will be rapidly winnowed out and moved offshore in suspension. *

You are correct that I and others from Moss Landing (Gary Greene) and the USGS (Steve Eittreim and Roberto Anima) disagreed with much of what Pat McLaren concluded, on the issue of near shore energy conditions and dispersion and removal of fine grainedsediments from this zone, I don't feel we have any difference of opinion. I've copied both Steve and Gary on this so you should feel free to contact them as well.

Thanks for the opportunity to comment and I hope this is helpful.

Gary Griggs
Director-Institute of Marine Sciences

RECEIVED
11/27/00

(FROM KAITILIN GAFFNEY)

Dr. Griggs:

As you may know, the Santa Cruz Port District has filed an application for an Army Corps of Engineers permit to allow disposal of harbor dredge materials in the nearshore area. Because the material does not qualify as beach nourishment material under state and federal law, the Port District is describing the project as a "demonstration project". The underlying basis for the request is research conducted by Dr. Patrick McLaren of GeoSea Consulting concluding that the proposed dredge materials would not remain in the nearshore area if disposed of in the surf zone.

I attended a presentation by Dr. McLaren at the Santa Cruz yacht harbor earlier this year where there appeared to be a great deal of disagreement within the scientific community over his conclusions. As a result, I have significant concerns about basing an important, and likely precedent setting decision, on Dr. McLaren's research.

Are you planning to participate in this management decision in any way? Can you suggest issues or concerns that might be appropriate to raise before the Army Corps or the various state agencies that will be involved in the permitting process? Can you suggest additional contacts on this issue? I recall several scientists from USGS raising serious concerns about Dr. McLaren's research results but do not have contact information for any of these scientists.

The comment deadline for the Army Corps permit is Dec. 13, 2000. The contact person is Rob Lawrence (415) 977-8447, rlawrence@spd.usace.army.mil

measurements, observations of bedforms, sedimentary structures, habitat surveys, etc) to support these interpretations. In some cases, the defined environments seem unlikely, and supporting evidence should be presented before the STA model results are accepted. Third, numerous publications in the open scientific literature are internally consistent in defining transport directions in the Santa Cruz area that contrast with those defined by the STA model. Finally, to our knowledge, the abundance of published research from inner continental shelf areas around the world does not provide any examples of transport occurring in such patterns as shown in Figure 6.

Of equal importance in evaluating the McLaren report and its conclusions and recommendations, the research conducted by McLaren and the sediment textural parameters he has measured and compared (grain size sorting and skewness), are properties of coarser-grained material (sand for the most part). Coarser-grained material moves primarily on or near the seafloor or as bed material; whereas the sediment of concern to the port district and their dredge disposal issues is primarily fine-grained sediment that is transported in suspension throughout the water column. These two processes operate very differently and independently for the most part.

In summary, the reviewers recommend that the report by P. McLaren not be used for management decisions regarding the fate of sediment discharged into the nearshore zone off Santa Cruz. Based on our understanding of sediment processes in the area off Santa Cruz harbor and in general, the subcommittee agreed that release of a relatively small (~ 12,000 yd3) amount of muddy sediment into the coastal waters should have little or no discernible or lasting influence on bottom or beach sediment texture. This conclusion is based on the understanding that discharges would be distributed over a winter-long series of large-wave and run-off events, in which case the natural contribution of fine-grain material to the nearshore environment will greatly exceed the amount from harbor discharge. The subcommittee strongly recommends that a scientifically sound monitoring program be established to learn the fate of material during and following the discharges; such information will be critical for future management decisions.

Michael Field, on behalf of:

Science Sub-Committee:
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M. Field, US Geological Survey
G. Griggs, University of California Santa Cruz
B. Jaffe, US Geological Survey
B. Richmond, US Geological Survey
C. Sherwood, US Geological Survey
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